

ART. VI.—*The Microscope, and Renal Affections; and particularly the condition of the Kidney known as Bright's Disease.* By W. J. BURNETT, M.D.

WITHIN a comparatively recent period, medical science has gained two powerful auxiliaries; and which have contributed to a more rapid, and at the same time a surer, progress in its various departments than at any previous time. These are, Organic Chemistry and Microscopy; the one seizing hold of matter as to its constituent, the other as to its anatomical, elements. And, although for the most part they have been obliged to be pursued separately, yet, with a good fortune for science, their results have generally closely corresponded. From organic chemistry, undoubtedly, have the most progress and the greatest benefits been derived. But this is due to its having had the most numerous disciples, and the means by which it has been pursued having been more perfect than those of microscopy. This last seems to have sadly suffered from bad instruments as well as from bad observers. Its results, therefore, until quite lately, have been less decided than those from chemical analysis. But now, in the days of better optics, this difficulty is not to be tolerated; and in discrepant results we must shift their causes from the instrument to the observer. It is mainly due to microscopy that physiology and pathology have lately become very great mutual aids. As I have said in another place, pathology seems to be but an errant physiology, and often where the typical characters of function are very difficult to be traced in the latter, they peer out in the abnormal relations of the former. The microscope, in elucidating the ultimata of anatomy, does not grasp physiological action; but, by showing exactly what the material agents of a function are, we can comprehend all that should be expressed by that word. Beyond this we cannot go at present, and perhaps never will. Secretion, that corner-stone of organic life, is now understood to be due to the action of cell-membranes; but it will be a long time, I think, before microscopy shall have explained why an epithelial cell-membrane of the mammæ eliminates milk, while one of the liver eliminates bile.

But it is to the development which this science has given to cell-genesis and cell-agency that its greatest benefit to physiology is to be referred. For, if everything is not cells, as has been thought, yet the cell-doctrine is so widely true that it may be said to embrace pretty much all we know of organic life. We have been led, of late, to give the word Nutrition a more pregnant meaning than before. It is, however, based upon cell-action. Through what the microscope has done to illustrate this very nutrition, it enters upon the wide field of intricate pathological science; for, within a few years, many of the best pathologists have referred to what has been termed *abnormal* nutrition, the great part of that class of actions that have their expression in

the phenomena of disease. Of course this makes us look to the nutritive fluid, the blood, as the great source of all morbid action, and so we are led, on scientific principles, back to the "humoral pathology" of other days.

The health of an adult organic form may be briefly expressed as that condition in which the delicate balance of decay and reparation is so preserved that its physical identity is continued. From the capillary blood-vessels is effused the plasma, a basement material in which all cell structures arise, and from which are replaced tissues passing away. The intimate nature of this plasma takes on the type of the tissue in and for which it is effused; this is one of the reasons why the part is so exactly replaced. This constitutes normal nutrition. But when there is an unnatural condition of the blood, from a want of a healthy ratio of its elements, or a want of a correct relation between it and its containing vessels, this plasma does not appear to preserve its type-power, and, after its effusion, is not readily and faithfully appropriated. Hence, true nutrition ceases, and here begins what is understood by *abnormal* nutrition.

This abnormal nutrition may be above or below the natural standard: with the former, it is expressed by homomorphous; with the latter, heteromorphous products. Under the vague yet comprehensive term *inflammation* is included pretty much the same class of phenomena, but not thoroughly so; for, although we may say that in the inflammatory process there is an abnormal nutrition, we cannot yet say that all abnormal nutrition is of an inflammatory nature. The decision of this question, indeed, appears of little scientific importance, because we know little or nothing of inflammation except from its subjective phenomena. But this much appears certain, that the more the microscope is made to hear upon the early condition of diseased parts, the more are we led to think that the disease is based upon, or very quickly succeeded by, an inflammatory process. I think this particularly true of the diseases of the secreting organs of the body, whose very function and connection with the vascular system subject them to it more than others.

The viscera we can rarely have for examination during their earliest diseased condition, and, even if we do, the unaided eye is not able generally to recognize it on account of its interstitial and very elementary condition. The value of microscopy in this relation can scarcely be rated too high. But I especially appreciate its aid in deciding between post-mortem changes and real commencing disease; a decision that can in no way be positive in many organs with the naked eye, as I shall have occasion to illustrate in the following pages.

Then, again, our opportunities for the examination of an internal organ may occur long after the disease first appeared; it once existed, but has long passed away, and we see only its direct or indirect results. This is true of inflammation more than of other diseases; it (inflammation) may have left the organ, as it nearly always does, with an impaired nutrition, below the natural standard; and with an *infra* nutrition for a period of time. Such curious changes occur then, that, judging from gross appearances, we lose all sight of the primitive disease. Now, unless it is in quite young subjects, the inflammatory process

always leaves its tracks behind it in a more or less tangible form, at least so that they can always be appreciated by the microscope, if not otherwise. I have already alluded to the value of these studies with the secreting organs of the body. But I know of no organs upon which these studies are more needed, for our correct comprehension of their diseased condition, than the *kidneys*. Aside from the manner with which practical experience has shown it to be true, it is apparent from the very structure and function of the organ. The kidneys are *excreting* organs; at any rate, their function does not seem to be one of a proper *secretion*. Their anatomy is as delicate and intricate as that of any other organ in the body, and their physiological importance is of the highest character, since they form the two great emunctories of the economy—and very slight pathological changes have both a corresponding intricacy and importance. Very slight deviations from their normal structure and function by disease give rise to very fully expressed pathological phenomena throughout the whole system. This importance has led pathologists to turn their attention very actively to these organs, but not with that amount of success, or that uniformity of result, that has attended equally zealous studies upon other tissues.

But, of all its diseases, that called Bright's disease is the most important, and although it has received almost unlimited attention, it is the one about which the widest difference of opinion has prevailed, and still prevails.

Its early history is well known, being first pointed out and its relations shown by Dr. Bright in 1827; and it was by him and Dr. Christison very thoroughly studied under the name of *granular degeneration of the kidney*.

Dr. Bright's investigations did not lead him to regard it of an inflammatory nature essentially, although inflammation might be one of its elements in some stages. The same may be said of the labours of Dr. Christison, who, however, took up more thoroughly the chemistry of the subject. After Dr. Bright, come the works of Gregory, Osborne, and many others, who, although they added largely to the experience in the disease, did not contribute much towards the elucidation of its intimate nature.

In a work soon after published, Rayer regarded the nature of the disease in a somewhat different light; it appeared to him as essentially a form of *nephritis*, which he called "*néphrite aluminense*," in fact a *nephritis* attended with aluminuria; and the thoroughness with which the subject appears to have been studied, and the vast array of facts and cases for its illustration, have not their equal in the whole history of the disease.

The work of Rayer merits especial attention, not only because of the comprehensiveness with which the subject is treated, but because he has, I think, more than many others, regarded the affection, as subsequent and more intimate study would seem to show it to be, viz: of an inflammatory character, at least so, if it is a purely renal disease. It is not for me here to run over the bibliography of this affection. I have mentioned some of the authors who studied it previous to 1840, and whose eminence has made them authorities. I pass over to the more recent period, since the

microscope has been used in this direction. I should, however, mention that in 1839, at the suggestion of Rayer, Valentin subjected this disease to microscopic examination. His results were, that the tissue was infiltrated with granular and albuminous matter—in fact, that this organ is the receptacle of an albuminous exudation from the blood, and that this constitutes the disease; thus lending support to the views of Dr. Graves, advanced a year previous. (*Med. Gaz.* 1838.)

Gluge (*Anat. Mikroskop. Untersuch.* 1841) was inclined to regard the disease as of an inflammatory character, judging from the microscopical appearances it presented; there being the inflammatory corpuscle, &c.

Eicholtz (*Müller's Archiv.* 1845), in an article on the relation of this disease to that of the liver, maintains that it consists in the appearance of a new fibrous tissue in the kidney, or, to use his own language, "It is characterized by excessive development of a substance resembling fibro-cellular tissue, by which the peculiar glandular structure of the affected organs becomes compressed, and their function interfered with."

This view, a similar one to which was put forth by Henle some years previous (*Henle und Pfeiffer's Zeitschrift*, 1842), we shall refer to on a subsequent page.

In 1845, Dr. Geo. Johnson, of London, proposed a view quite different from the views of all who had preceded him (*Med. Chir. Trans.* vol. xxix.), and the singularity of which, I confess, led me to turn my attention more particularly in that direction. To use his own words, "The disease then appears to be a fatty degeneration of the kidney, precisely analogous to the fatty degeneration of the liver." Since the appearance of his first article, several others have been published, all having the same bearing, and corroborating the doctrine first advanced.

There are without doubt some facts that apparently support this unique view, but I am not aware that it is generally recognized as tenable by leading pathologists. It is mainly to show that some carefully made experiments of my own have quite a different bearing, and that another view is tenable, that this article is written. To facilitate the comprehension of several succeeding points, I shall begin at the beginning, and state briefly the minute structure of the organ. It consists of the following: 1st. *The fibro-cellular matrix.* This is the framework of the others, and it is in and through it that they pass. 2d. *The Malpighian body.* This is the excreting organ, and consists of a bunch of terminal arterial vessels encased in an infundibuliform dilatation of the urinary tube. 3d. *The urinary tubuli.* These are tubes of about  $\frac{1}{300}$ th of an inch in diameter, lined with a very delicate basement membrane which is studded with epithelial cells. These tubes are tortuous and branching in the cortical or secreting portion of the organ, while they are straight in its medullary part. The epithelial cells become more and more delicate as they pass up from the calyces to the Malpighian body, and those lining the expanded portion of the tube about this last, are quite transparent.

It will be noticed that the above is according to the views given by Mr. Bowman, with which both my anatomical and pathological experience coincides. We have then a delicate mesh-work, through which permeates a system of fine tubes that end in a system of most delicate blood-vessels, which last have an arrangement for the transudation of a part of their contents into the former.\* The question whether or not free fat exists anywhere in the healthy human kidney is of much importance, as bearing upon doctrines of disease. It is best decided, I think, by reference to results obtained from lower animals, for the artificial habits of man have changed somewhat the molecular condition of some of his organs. I think, with Dr. Gairdner (*Contributions to the Pathology of the Kidney*), that free fat does not belong to the normal human kidney, and I base my opinion upon a series of observations I have lately made upon many of the higher animals in both a wild and domesticated state.

In quite a number of species of the *Rodentia*, and some of the *Carnivora*, living in their natural wild state, I have never been able to find any free fat whatever. From this, I think it fair to conclude that, whatever may be the generality of appearances now presented, the human healthy kidney should have no fat, which would be the case, perhaps, if man was not at all artificial in his mode of life. Now, although the presence of free fat in the kidneys of man and the higher animals may be an *abnormal* condition, yet I think we are scarcely warranted in saying that all such kidneys are diseased; because experience has shown that it does not, unless completely surcharging the organ, interfere with the discharge of its normal function. The investigations of Mr. Simon (*Med.-Chir. Trans.* vol. xxx.) go to show that it depends upon irregular and unnatural conditions, and does not particularly affect the action of the organ. But that I might have the satisfaction of my own experience, I lately made a series of examinations for this object. They led to the same results. I found that, in wild animals, confined pretty closely and then well fed, free fat began to appear in these organs. The same I found true of numbers of old dogs and cats which lay in and about the house, their life passed in sleeping and eating. In all of these, the health appeared to be good, and in the few opportunities I had for observation there appeared no change in the discharge of the urinary function. In all these cases, I found the fat existing in the epithelial cells that line the tubes; often it was found in such quantities as to have supplanted the cells, being more abundant in their straight than in their tortuous portion. In no instance did I find it extend to the Malpighian body, which always presented a normal aspect. This, I think, satisfactorily accounts for the correct character of the function,

\* To one who is not acquainted with it, the structure of the kidney cannot be explained without the aid of diagrams, and in the above brief description I have presumed much on the reader's knowledge, it being given only as a groundwork of the subject.—Vid. *Cyclopad. of Anat. and Physiol.* pts. xxxii. and xxxiii. art. *Ren*, for a thorough illustration.

and although fat and epithelial cells loaded with fat may be found in the urine, as has often occurred to me, they in no way argue that the urine is not of itself normal, and was not normally excreted. Fat existing in these relations cannot, I think, ever lead to much harm, or be of a serious import, unless it be in such quantities as to obstruct the free passage of the excretion, or is an expression of that retrograde metamorphosis of tissue of which I have elsewhere spoken.

Dr. Johnson, in his various papers, regards this form of fatty kidney quite different from another which he thinks exists, and which is the one in his opinion constituting true Bright's disease. If he refers to free fat existing in another form as a primary product, I must say that such diseased condition of the organ has not fallen under my experience.

During the late appearance of cholera in 1849 in Boston, I had an opportunity to make a series of examinations as to this point in the human subject. Many of those who died were of robust health before attacked, and, as far as could be learned, were not subject to disease.

Aside from the slight desquamation of the epithelium from the tubes, and which belongs to the disease, the organs from different subjects presented microscopically a variety of appearances as to the presence of fat in their structure, indicating conditions of long duration, and quite distinct from that belonging to the disease of which they died.

It would appear, from what I then observed, that this kind of fatty kidney is not uncommon with the low classes of people, who are unfortunate in their conditions of life, whose food is bad and unequal, and living, withal, in an impure atmosphere.

In these cases, as in the animals above mentioned, the fat existed in a free form both in and out of the epithelial cells—the Malpighian body and its tubular sac remaining intact.

Associated with this fatty condition of the kidney was the same condition of the liver in most cases; which late experience has shown to be not uncommon in the classes of people I have mentioned.

On a subsequent page will be found a case, or cases, illustrative of this condition of the organ occurring under somewhat different circumstances of life.

Such are the relations of the presence of free fat as a primary product in the kidney; and, as a deposition, it must come in that same category, as the presence of the same in other tissues, with individuals in whom this fatty crisis exists generally. And I repeat that I think it may exist in these organs to quite an extent with impunity, in fact, until by its great quantity it may impinge upon either the excretory or efferent structures of the organs; then it is disease, because the function is impaired; which, in my opinion, occurs with a rarity bearing no proportion to the number affected with what is termed Bright's disease.

It is now for me to take up the subject proper, and describe what I consider to constitute the real pathology of this disease; to point out some of the

structural and functional peculiarities consequent upon its primary invasion, and to show how some of these secondary results may have been taken for the primary disease itself. In the first place, I should say that the term "Bright's disease" has been objected to by many, on the grounds that it expresses nothing of the nature of the disease, and its experience includes several different diseases. All this is very true, and especially the latter, if we adopt Dr. Johnson's view of the subject, for he says, "Acute and chronic desquamative nephritis, and fatty degeneration of the kidney, include the greater number of those cases to which the term 'Bright's disease' is commonly applied."

But I am of the opinion that the term should be preserved, not only because it honours and preserves the name of him who first described it, but because the disease Dr. Bright intended to describe is, in my opinion, single, and primitively of a uniform character.

There are many reasons why, in pathological experience unaided by the microscope, doubts should exist with some as to what class of morbid appearances should be intended to be expressed by these terms. This arises from the fact that the kidneys, more than any other organs of the body, simulate, from post-mortem changes, a variety of morbid aspects; and then again the disease really existing may not be at all apparent to the naked eye. This is so true that I have frequently heard professed pathologists declare that they are often unable to decide whether the organ before them is healthy or diseased.

On subsequent pages will be found cases, one showing that although albuminuria and other symptoms of this disease existed during life, the post-mortem showed that, according to *gross appearances*, the organs must be reckoned healthy; yet the microscope showed disease; the other showing that although the patient had no urinary or renal symptoms whatever, yet after death there were found gross appearances exactly like those of Bright's disease, the microscope showing it to be due to a curious congestion.

Cases like these may, perhaps, show why it is that some authors have declared that they have met with true albuminuria and other symptoms of the disease, with no pathological appearances whatever to correspond; and also that they have met with all the pathological appearances without a corresponding symptom. I will add that all this well illustrates how we are obliged ultimately to refer to minute investigations to correctly define the nature and nomenclature of a disease.

Bright's disease appears to me to be one of a decidedly inflammatory character; it is primitively an acute, or a subacute nephritis.

This opinion I have formed on the following data: 1st. Its general and symptomatic character. 2d. Its close relation with diseases of other organs of an inflammatory type. 3d. Its relation to pure nephritis of scarlatina. 4th. The microscopical appearances presented, there being invariably an inflammatory product found. And 5th. From the fact that such view enables us to reconcile pretty generally the phenomena of the disease.

Such being the beads, we will now take them up in detail:—

1st. *Its general and symptomatic character.*

It is not the good fortune of medical science for us to be often able to observe the very first symptoms of some diseases. This is especially true of the disease under consideration. Its commencement is, in the majority of cases, insidious—and the individual presents himself before you after the preliminary symptoms have passed. Still, I am of the opinion that, however obscure may be its commencement, yet if it can be carefully observed, it will be found attended with inflammatory symptoms, though sometimes of a quite light and transient kind; there may be no “lumbar pain,” but there is a slight general febrile movement, some quickening of the pulse, and a feeling of general *malaise*.

But the history of recorded cases shows that in very many it is ushered in with well-marked symptoms, such as general febrile action, headache, local pain, &c. &c. These may be of very short duration, and the disease, once commenced, may pursue a course so chronic, that one would never mistrust its primitive type. This is certainly one reason why it has been considered by many as a non-inflammatory affection. Thus I have noticed in several cases I have carefully watched that for week after week, although there was constant albuminuria, I could find no febrile action, and the skin and pulse were normal. But at irregular intervals, there would suddenly appear a febrile movement, attended with local pain, and, although lasting but a few hours, was always followed by a greater quantity of albumen in the urine.

Where an inflammation of an organ passes into a very low chronic form, the nutrition of the part is so much altered, in fact becomes so low, that it is exhibited, if I may so express myself, little or not at all in the general system; and, like an indolent ulcer, it may exist for a long period of time, having none but local influences and relations.

When it occurs idiopathically, its etiology, according to all experience, shows that it can nearly always be referred to the same exciting causes which produce inflammatory affections in other organs. Such are exposures to sudden changes of temperature, to fatigue, and dampness; and, according to the accumulated experience of Rayer and other authorities, it is most common in the professions which habitually place men under these unfavourable circumstances of life. I am not aware, however, that the tendency of such experience is to show that these hard-working, muscular people are at all predisposed to fatty degenerations of any kind.

2d. *Its relation to diseases of other organs of an inflammatory type.*

Although Dr. Bright, in carefully studying this disease when it was first known, did not regard it of an inflammatory nature, yet he perceived that there was co-existent with it a general tendency in the system to inflammation. He was, therefore, induced to regard it as the real cause of various diseases of other organs, such as the heart, lungs, pleura, and liver, which seemed to supervene upon its presence.



He thought that the retention in the blood of elements that should be eliminated by these organs led to such alterations of its character, that these affections necessarily supervened. Of the coexistence of these affections there can be no doubt; and there are many recorded cases which would lead us to look upon the matter in the light of cause and effect. But since the early memoirs of Dr. Bright, and since experience has been accumulating in all directions, the medical world has been somewhat at variance as to what interpretation should be put upon these coincident phenomena. This has arisen from the fact that, after the review of a great number of cases of this kind, in very many, if not the majority, the diseases of the other organs have been found to be more chronic and of longer duration than that of the kidneys. And the more is this found to be so, as opportunities are the more abundant for carefully learning the patient's previous history.

The following questions then arise: When it thus occurs coincidently with these other diseases, are we not to consider the whole as a *blood-disease*, producing a low inflammatory tendency throughout the system, these organs being those in which it is expressed? Or are we to consider each as a local disease, producing, after a time, those changes in the blood that successively give rise to the affections of other organs?

At this time, the former view is most in accordance with observation—and what appears remarkable, it is supported by that very same class of cases which have been construed for the latter.

This is the view which has been adopted by Rokitsansky (*Pathol. Anat.*, Syden. edit. vol. ii. p. 185), and since then by Rees (*On Diseases of the Kidney*, &c., London, 1850), and Walshe (*London Lancet*, July 14, 1849). The opinions of such authorities as these, certainly, aside from other considerations, entitle this view to some weight. Moreover, it appears in accordance with some of the leading doctrines of the more modern pathology, which, by the light thrown upon them by organic chemistry and microscopy, appear to be recurring to those of other days.

Aside from the general tenor of cases, it is supported in the fact that all, or nearly all of the co-existent, connected diseases show themselves to be of a low inflammatory character. Such is the arachnitis as shown by Dr. Osborne, and the bronchitis, pleuritis, and peritonitis, and the pseudo-rheumatic disease which have been described by others.

But still more is this view supported by the fact of this disease supervening upon other diseases of a purely inflammatory character, or which have many inflammatory characteristics, having also a distinct and isolated origin. Such are chronic pleurisy and pneumonia, and especially phthisis. Recorded experience is quite full on this point, for it has at the outset arrested the attention of all observers. In chronic pleuro-pneumonia and in phthisis I have had the good fortune to have opportunities to see it, and that, too, under circumstances permitting careful examinations before and after death, from

which I was satisfied of its very short duration. At the end of this article I have introduced one of these cases as illustrative of this point.

I can see of no other constriction to be put upon such phenomena than that a local inflammation, existing for a length of time, leads to a general dyscrasia; a low inflammatory tendency generally, and which would quite naturally have its expression in such an organ as the kidney, in which the nature of the blood is so carefully analyzed.

When occurring in those cases of phthisis that have fallen under my observation, there being many of the symptoms of true Bright's disease, I have been unable to see in these very emaciated subjects the least ground for supposing a fatty degeneration of the organ.

3d. *Its relation to nephritis of scarlatina.*

In studying the intimate nature and pathology of Bright's disease, the phenomena presented by the kidneys in scarlatina are of great importance, for from their unmistakable nature they give something of a positiveness to our conclusions.

The recognition of renal trouble as forming a part of this affection is really of modern date. I am aware that it was hinted at by writers of twenty or more years since; and Rayer, in his comprehensive work (vol. ii. p. 429), in speaking of the few opportunities presented him, says that he "has noticed that the organs were quite often hyperæmic," &c. The recurrence, however, of this epidemic within a few years, under circumstances admitting of its most careful study, has given a decided character to the feeble views before entertained.

We now recognize it as a part of the disease, and I have been informed that, lately in London and Edinburgh, with some obscure cases in which the cutaneous marks were quite dubious, or did not exist, the disease was successfully diagnosed by the more prominently marked renal symptoms.

Aside from quite numerous papers found in various journals, the work of Dr. Miller (*The Pathology of the Kidney in Scarlatina*, London, 1850), recently published, shows the attention this subject has of late received.

In this disease it would appear that a morbid agent has been introduced into the system, having its expression in the cutaneous and mucous surfaces.

Whether the excited and inflammatory condition which the kidneys here presents is due to the direct action of the poison itself, or is indirectly due to the sudden and almost complete cessation of the cutaneous function, I am unable to say. But I think most probably the latter, since I have noticed similar renal troubles in patients affected extensively with other cutaneous diseases.

The point, however, is of no great importance in this matter; for you have, at any rate, an unmistakable nephritis, supervening upon, or forming a part of, another disease. Consequent upon, or at least co-existent with this nephritis, you have, for a brief period, all or nearly all the symptoms of true Bright's disease.

Dr. Johnson, however (*Med.-Chirurg. Transact.* vol. xxix.), does not view

it as such, and thinks the phenomena here presented should come rather under the head of desquamative nephritis. But this appears to me quite unsatisfactory, for I consider every nephritis as desquamative, and almost necessarily so; exactly as is every inflammation of the true skin. This point needs some explanation as well as another, often urged, viz: the dissimilarity of this disease from true Bright's, as it commonly appears, as to its transient and curable nature.

In every inflammation there is a cessation of the normal nutrition of the part in which it occurs, and, if any nutrition at all exists, it is with the elimination of abnormal products. When, therefore, it exists in the kidney, an organ as we have seen of most delicate structure, the lost balance between the decay and reproduction of a part is quickly perceived. The epithelial cells, forming so large and important a part of its structure, cease to be nourished—they therefore “drop off” from the basement membrane to which they are attached, and minute granular, oleo-albuminous matter occupies their place, and we have then presented, both in the kidneys and in the urine, all the appearances of desquamation. Now, according to my own experience, it is of no account whether the renal inflammation be due to one cause or another; and I have alike witnessed these phenomena in cases of inflammation with tuberculous disease, and in common nephritis. To be sure, in a disease so acute in its action as that of scarlatina, the phenomena are best marked.

In regard to the second point, the transient and curable nature of the affection generally, it corresponds with our best ideas of the nature of nutrition and inflammation. In the first place, I should say, that the more recent experience with diseases of children, and since attention has been paid to examination of their urine as far as practicable, albuminuria and some of the other symptoms of nephritis are found to be with them of not uncommon occurrence, and yet of a very transient nature, coming and going like a light inflammatory trouble of the mucous air-passages. I have had occasion to see instances of it supervening upon severe infantile diseases.

It is well known that inflammation, as it exists in children, is somewhat different, as to its characteristics and results, from that of adults. There seems to be a far less departure from the normal nutritive type of the part, and if the normal nutrition is entirely suspended, there is not a marked tendency to an abnormal one leading to the production of adventitious products. And, if I may so express myself, the *type-power* of the part is still so active that its peculiar nutrition is not easily displaced, and when the disease subsides, the part soon gets back to its former condition. This is fully illustrated in every department of infantile pathology.

This is truly so with the kidneys in scarlatina; the vigour of the normal nutrition soon places the part as the disease found it; and although a most delicate structure, it preserves its proper continuity. In surgery, with infants, we well know that the younger and more vigorous the child, the more perfect

the repair. Exactly so it is, I believe, in scarlatina, and I have now in my mind some cases a friend related to me, in which adults having scarlatina, the renal symptoms never left them, but passed on to common Bright's disease. This has shown to me that, although nephritis may occur with impunity in children, it rarely does so with adults.

4th. *The microscopical appearances of the kidney in this disease.*

We have already been over the symptomatology of the disease. It now remains to refer to the material expressions of the disease as elucidated by microscopical inquiry, and it is hoped that the two may be made to appear quite compatible.

The conditions in which you may find the tissue of the organ after inflammation vary so much according to the duration or original severity of the latter, and its injury of the normal nutrition of the part, that some explanation may be necessary. But that this may the better be done, I will allude briefly to the gross appearances.

Dr. Bright thought that these might be considered as *three*. The first being that of ordinary congestion; the volume of the organ being much increased, the cortical substance being most abnormal in its aspect. The second is the true granulated kidney, there being apparently a granular deposit in the organ giving it the peculiar mottled aspect. The third is that of the most advanced stage; the organ is generally of a decreased volume, is contracted, and has a hard and often cartilaginous feel, with a pale anæmic aspect.

The first may be considered as that of the disease proper, and the last two as those of the results of the disease.

Rayer still farther divided the aspects, making *six* forms—perhaps a rather too detailed subdivision, since it somewhat complicates the subject. I need not here notice these divisions: but will only add that the first three correspond to the first of Bright; the fourth and fifth to the second; and the sixth to the third. Dr. Bright's division of the pathological appearances seems both the most simple and judicious, as it corresponds very closely with the progress and results of the disease.

We will now see how the microscopical correspond with the gross appearances, at the same time alluding more carefully to the details of the latter. The disease being originally in the vascular portion of the organ, it is to this that we are to look for the primitive lesions—the alterations of the other tissues being referable to this, either directly, as from mechanical agencies, or indirectly, through the affected nutrition.

In the few cases in which I have had the good fortune to be able to examine the organs in the early part of the first stage, I have found the arterioles and Malpighian bodies turgescient and increased in size, the latter often misshapen—phenomena which I think are not observed in simple *non-inflammatory* congestion of the vessels.

The size and general aspect of the tubes in this stage do not appear much changed, and the abnormal appearances are to be looked for in their contents.

An inflammation can exist but for a very short time in the organ before its effects are very appreciably perceived in the delicate epithelial tissues. The epithelial cells of the tubes of the cortical substance are found to have lost their natural delicate character, and to have a somewhat shriveled aspect. Moreover, there is some exfoliation, and both in the place of and in the cells will be found fine granular matter, and not infrequently free fat in fine globules. This condition extends up to the Malpighian bodies.

The granular matter and the free fat I conceive to be the direct products of the inflammatory action. The healthy nutrition being suspended, the hyaline blastema which is effused from the blood-vessels does not suit the wants of the tissues to be nourished, and therefore is not taken up and appropriated; moreover, it is of a low character, and not capable of cell-attainment—resting on its granular stage of development. These granules, as I have elsewhere observed, consist of a minute particle of oil surrounded by an envelope of albumen; in fact, they are *utricles*, and not granules. In their process of formation, according to the *Acherson* mode of the formation of cells, if, whether from the quantity or the quality of the albumen, the conditions are not harmonious, the superabundant oil remains as such in the form of free globules. In all effused blastematous fluids, we know that oil forms in some shape a very important ingredient; and especially is this true of most inflammatory products in which the natural relations of the constituents among themselves is partially lost.

The very fact of the oil particles and utricles being in the cells, shows that they could get there only through the dyscrasia of the blastema.

Engorgement of the vessels throughout with the presence of granular matter in place of or about the passing away epithelial cells, besides often free fat, constitutes the microscopical appearances noticed at this stage of the disease. The alteration of the other tissues belongs properly, I think, to Dr. Bright's second form, the true granular kidney; although, strictly speaking, the changes we now see are referable to the agency of the first condition.

In the second stage another condition of things exists, the more active inflammation appears to have subsided, and what remains is of a low indolent character. Therefore, although we may see the effects of all this in the vascular system, yet the condition of the other tissues is what most arrests our attention. I may also remark that the feebleness of vascular action generally, which commences in this stage to be completed in the next, gives to the vessels often a less than their natural fulness.

The natural relation of the fibro-cellular tissue to the vessels and tubules, of which it is the supporting structure, is lost. From the abnormal nutrition it becomes hypertrophied locally or generally; in the former case giving rise to those small white spots, which, at this stage, are disseminated throughout the organ, and entitle it to the name of *granular*. Then again it may become atrophied, or more consolidated, leading to contractions and other appearances which we shall soon notice. In and about this fibro-cellular

tissue is effused more or less of this inflammatory granular matter. When in considerable quantity, it may form a fibrillated tissue by a linear arrangement of the granules into fibrillae, these giving rise to white spots not unlike those produced by a local hypertrophy of the normal tissue. This I have seen in a few instances. This fibro-cellular tissue being thus changed, its passage-ways for the transmission of the tubes and vessels are quite altered, and misshapen tubes and compressed vessels are the results. The condition of the epithelial structures is like that of the first stage in character, but worse in degree. More granular matter and more free fat are generally found; and with these are sometimes found a bulged portion of a tube apparently completely clogged, its excretion being prevented by a constricted part below. There is one other appearance I have frequently noticed: this is the irregular and unequal form of the Malpighian bodies; some quite small, others very large—all due, in my opinion, to the irregular growth or action of the supporting tissue.\*

The appearances presented in the third form are only an increase upon those we have just considered. The supporting tissue becomes more and more hypertrophied and condensed, and loses much of its former areolar character; low granular products are scattered through the organ, and the Malpighian bodies have a tough, bloodless aspect; all seeming to forbid any healthy or other action whatever of the organ. It certainly is a matter of some surprise that the blood transudes anything through such a structure. All these microscopical appearances which we have just traced belong, as must be seen, to inflammation and its results.

It now remains for us to trace how far such changes in the minute structure are compatible with the symptomatology and gross pathology of the disease.

The enlarged volume, the general turgescence of the vascular system of the organ, accord well enough with the microscopical appearances found. The albuminuria of this stage, however much of it may be referred indirectly to a general blood dyscrasia, is due, directly I think, to the vascular congestion, there being a serous transudation through the Malpighian tufts. That this is so appears to be shown from the fact that the Malpighian body is often found stained with the colouring matter of the blood, which not only indicates that there has been quite a congestion, but that the serum of the blood might pass in the same way. Some of the albumen found in the urine may come also from the abnormal albuminous effusion into the tubules; but it is mostly from direct transudation. This transudation I do not regard as due to mechanical relations alone, since, were it so, all congestion, whether inflammatory or not, should lead to the same results. This, however, is not true. There is an unnatural relation existing between the vessels and their contents, and this,

\* These alterations in the fibro-cellular tissue are those which Hentle, Eicholtz, and others have regarded as constituting the disease.

aside from the dynamic causes, leads to an easy separation of the albumen from the blood.

In the second stage, I conceive the albuminuria to be somewhat dependent upon other causes also; in fact, due to the results of the inflammation as much as to the inflammation itself.

The alterations of the fibro-cellular tissue which I have just pointed out lead to equally serious phenomena in the circulation. The Malpighian bodies and vessels generally are compressed, their action irregular, and with a pre-existing dyscrasia in the blood, an evil constantly fostering itself, it is easily conceived how they may strain the albumen from the blood. Add to this, constantly pressing blood from an inflammatory action on these compressed recipients, and you have, I think, a sufficient cause for the increased albuminuria of this stage.

In the third and last stage, these causes are still more active, and you find adequate reasons not only for the excessive amount of albumen, but for the very anæmic state of all the vascular tissues.

The atrophy and contractions of the second and third stages I conceive to belong purely to the sequelæ of inflammation, in exactly the same light as those of wounds and cicatrices.

During the more active inflammatory conditions of the disease, there is effused a considerable quantity of an adhesive plasma, which interstitially and otherwise forms attachments to various points. When the active stage of the inflammation subsides, and this ceases to be thrown out, an absorption of the hyaline portion takes place. From this, and from a concomitant condensation of the fibro-cellular tissue, I conceive the various contractions and puckerings so often seen to occur. What gives strength to my opinion in this matter is, that I have frequently examined the bridges of the contractions, and have found them to be an adventitious product.

The atrophy is dependent upon like causes, the increased amount and condensation of the supporting tissue at the expense of the vessels and tubes. This will appear a sufficient cause alone, when we consider for a moment the large proportion of space these last occupy in the healthy organ.

But I think there is another cause for the atrophy, and to which I have alluded in another place. I refer to *retrograde metamorphosis*, the nature of which change I need not here point out. It can well occur in an organ where the nutrition is so depraved; and a retrocession of some of the nourished normal tissues back to their primitive granular type, and then a partial absorption of this last, afford an explanation not only of the obsolete character of some of the tissues found, but also of some of the diminution of size of the organ, and of the presence of free fat in the part.

I have selected from my note-book the following cases, illustrative of some of the points I have just treated. That they may be entitled to the name of cases, I have given them with all the general symptoms, yet in an abbreviated

form, and with a curtailing of some of those details which, if written, are never read.

The cases occurred in the practice of the Massachusetts General Hospital, Boston, with which I was then connected as one of the house-officers. Owing to the completeness of the means this institution furnishes for medical inquiry, I have thought them the more worthy of regard.

**CASE I.**—*Cardiac Disease of one year—Edema of the Extremities for five months—Symptoms entirely Cardiac—Death at the end of the third week. Autopsy: General Dropsy—Disease of the Heart—An apparent, but no real Disease of the Kidneys.*—D. S., æt. sixty-four, entered the Massachusetts General Hospital May 4th, and gave the following report: One year since, without appreciable cause, began to have distress and severe palpitation in the cardiac region. This continued for seven months without any added symptom, when first noticed swelling of feet and ankles. This last, extending rapidly, was soon followed by that of the upper extremities. Has noticed no renal or urinary symptoms—and until the last two months has been able to be up and about; at the time of entrance he was quite feeble and unable to stand, and the oedema of each extremity was strongly marked. His countenance had that pale, lifeless aspect met with in cardiac and renal disease. Most of the symptoms seemed referable to the heart, where, upon percussion, there was a less than normal space of dulness; the impulse was preternaturally strong; the first sound muffled, and with an endocardial murmur. The second sound normal. The urine, upon examination (the urine of all the cases was the *urina sanguinis*, or that passed in the morning), had a specific gravity of 1.012, but was normal, chemically and microscopically.

The oedema increased, and symptoms of debility supervening, he died at the end of the third week from entrance. Previous to death, the urine was several times examined, but in every instance appeared normal.

*Autopsy nine hours post-mortem:—*

*Brain.*—Ventricles dilated with serum.

*Lungs.*—Compressed by considerable serum in both pleural cavities, and congested posteriorly.

Right upper lobe universally diseased, apparently like chronic pneumonia, being solid, grayish, non-friable, and with no pus or trace of tubercle. Tissue of lungs otherwise normal.

*Pleuræ.*—With old and strong adhesions over the whole of the upper right lobe.

*Heart.*—Pericardium with natural amount of serum. Weight of organ  $\bar{\text{xxx}}$ . Left ventricle with walls red and firm, and having seven-eighths of an inch maximum thickness. Cavity not dilated. Columnæ carneæ not hypertrophied. Slight disease at the base of the aortal valves. Otherwise, organ normal. Some ætheromatous deposit in aorta, but no dilatation.

*Alimentary canal* normal.

*Liver.*—Not fatty, and apparently healthy.

*Kidneys.*—Each weighed  $\bar{\text{ijij}}$ , apparently much diseased, being small and tough. Surface rough, and having a mottled aspect, being a white mixed with a rather light red. On incision, cortical portion quite thin, the tubular portion approaching near the surface. Colour, mottled as externally. The whole appeared quite like the representations of Bright's disease. On stripping off the investing capsule, small lymph-like portions came with it.



By microscopical examination, the tubules of the medullary and cortical portion appeared quite normal, not irregular or distorted. The same may be said of the Malpighian bodies. The epithelium had its usual healthy aspect, and there was no appearance of desquamation either local or general. No appearance of granular matter in the tubules or elsewhere in the organs, and no fat, free or combined.

The few white points on the surface of the exposed kidney, and also adhering to the capsule, were found to be little sacs filled with columnar epithelium; and their slight attachment to the investing tunic caused them to be torn from their beds, when the former was stripped off. No appearance of granular matter about the surface, and no distinct adhesions.

I have related this case, not because it illustrates disease, but because it aptly illustrates the opposite. I consider it a case well showing the value of microscopical aid in the pathology of this organ. The gross appearances were those of a chronic Bright's disease; whereas, the excreting structure of the organ appeared, microscopically, normal—and this last corresponds exactly with the symptoms during life. I do not pretend to explain the shrunken and unnatural size of the organs. Neither am I well acquainted with their condition in elderly people dying of any chronic disease. The mottled appearance both externally and internally was, it appears to me, due to the peculiar mode of the congestion of the organ at the patient's death; and such singular appearances, it is well known, are not uncommon.

Pathology makes quite as great an advancement by our discrimination of what is *not* disease, as of what *is* disease.

**CASE II.—Pulmonary Phthisis of many months—Symptoms entirely Pulmonary—Albuminuria, without other Renal Symptoms, the last month—Death.**  
*Autopsy: Disease of Lungs and Kidney.*—M. M., æt. 23, entered the Massachusetts General Hospital October 27. According to her history, she had had for several months the usual symptoms of advancing phthisis. At the time of her entrance, the tuberculous disease appeared confined to the left lung, at the summit of which were the physical signs of a cavity. The subsequent symptoms were wholly, directly or indirectly, pulmonary—and the disease pursued a steady, though not rapid march. From time to time I had analyzed her urine, and did not find it abnormal except in the excess of urates which usually occur during the febrile disturbance of phthisis.

On March 10th, the urine was carefully analyzed, yielding the usual results.

On March 13th, it was again analyzed, and the following is the record I then made: Of a turbid, amber colour, and with a cloudy, rolling sediment. Specific gravity 1.021, moderately acid. By chullition and nitric acid it appears *albuminous*, so that the whole is quite troubled in aspect. By microscope, the usual appearance of coagulated albumen in urine.

On nearly every third day from this time until her death, the urine was examined. The specific gravity fell to 1.010, where it remained; the albumen rather increased, and at no one time was it found less or absent.

The disease advancing, on April 18th she died with the ordinary symptoms of phthisis, and I do not think that during the last week she complained of any local renal symptoms.

*Autopsy 6 hours post-mortem.*

*Head not examined.*

*Lungs* extensively tuberculosed throughout. On the left summit one large cavity, and small cavities elsewhere.

*Liver* rather large, weight 4 lbs. 3 oz. Edges smooth and rounded, aspect paler than natural. Incised, it had a doughy, soft feel. A thin slice under the microscope showed the epithelial cells to be crowded with oil, and very numerous fat-globules occupied the hepatic tissue.

*Spleen*, weight 5xiiij; otherwise not abnormal.

*Alimentary canal* presented nothing remarkable.

*Kidneys* of normal size and shape; weight of each 5vss. Incised, they presented nothing remarkable; there was a natural proportion between the medullary and cortical portions. The investing tunica peeled off, leaving a smooth surface, which, however, appeared congested. I well remember that they were thrown aside, as presenting nothing remarkable, by one who is well qualified to judge of gross pathological appearances.

By microscopical examination, a thin rasorial section of both the medullary and cortical portions showed the tubes as normal in size and shape. But their epithelium had not its usual full appearance. Some of it had disappeared, being replaced by granular matter, which last, in fact, seemed scattered through the tubes, extending even to the Malpighian bodies; which, however, did not appear so much changed as the efferent tubes. In the cortical portion the appearances of inflammation were most prominent, disappearing as one approached the calyces. Although I examined with particular reference to the point, I found, both chemically and microscopically, no appearance whatever of free fat.

This case illustrates many points to which allusion has been made in the preceding pages. It shows, like the first, the value of microscopical aid in our studies of this kind; but, unlike it, it shows what *is* disease. I may add, had it not been for the aid thus furnished, it would have been passed by as one of those remarkable cases in which albuminuria exists with the other usual symptoms, without any apparent renal alteration, and about which Dr. Graves (*Medical Gazette*, 1838) has written. It has, therefore, more than ordinary importance, touching, as it does, that class of curious cases.

It shows also how renal inflammation, of a subacute character, may supervene upon another disease of an inflammatory type, and which, from its long standing, gives rise to a prominent dyscrasia of the blood. Here, also, the microscope showed that, although the liver was crowded with fat, no trace of it was found in the kidney.

CASE III.—*Cardiac Symptoms of six months—Excessive general Œdema and Pleural Effusion—Albuminuria, without other Renal Symptoms—Death. Autopsy: Disease of Heart and Kidneys.*—E. M., æt. 38, entered the Massachusetts General Hospital May 4. He then reported that, six months previous, he began for the first time to notice cardiac trouble, by palpitation and dyspnoea. These continuing to increase, one month since he relinquished all work. Œdema commenced two weeks since, and, aside from these, knows of no other symptoms.

At time of entrance, he was feeble, and scarcely able to stand—whole aspect that of one having great difficulty of respiration, which last was quick and short. Pulse regular, but full. Œdema of every extremity, but especially of legs. By physical examination no signs of pleural effusion, the pulmonary symptoms being referable entirely to the heart.

By percussion, an unusually large space of dulness over heart. Impulse about normal. First sound attended with a dry endocardial rustle at its close, which sound extends up line of aorta. Second sound abrupt, and attended with a slight murmur.

The urine examined was loaded with phosphates. Specific gravity 1.020. By the usual tests, there was an appreciable, though not large, quantity of albumen. The microscope showed considerable minute granular matter like that of inflammation, in the deposit.

The march of the disease was rapid. Symptoms of pleural effusion appeared; the oedema increased; and the dyspnoea becoming quite urgent, he died two weeks after entrance with the usual symptoms of asphyxia.

*Autopsy* eighteen hours *post-mortem*.

*Head*.—Brain and membranes normal, but ventricles dilated with serum.

*Chest*.—One quart of serum in each pleural cavity; lungs much compressed thereby, but tissue normal.

*Heart*.—Pericardium contained one pint of serum. Weight of organ 1 lb. 6 oz.; of a rounded shape, and apex flattened. Cavity of left ventricle dilated to three times its normal size, but its walls not thickened. Columnæ carneæ prominent. Aortic valves nearly natural. Right ventricle and both auricles with their cavities a little dilated, but their valves healthy.

*Alimentary canal* presented nothing remarkable.

*Spleen*.—Weight 13 oz., and full of blood; otherwise normal.

*Liver*.—Weight 3 lbs. 8 oz., of healthy aspect and not fatty.

*Kidneys*.—Weight of each 5 oz., presenting nothing peculiar externally. Incised, the ratio of the two portions normal; but the whole had a red, congested aspect. Scattered through the cortical portion were white masses, circumscribed, and varying in size from that of a millet seed to that of a small pea. Stripping off the investing tunic, it carried with it minute portions of the kidney, leaving the surface quite rough, and in which were imbedded several white masses like those seen in the interior.

On the whole, according to gross appearances, if we except the white masses and the adhering tunic, the general aspect would not differ, I think, from that of many simply strongly congested kidneys I have seen. And certainly it had none of that peculiarly mottled and granular aspect of ordinary Bright's kidney.

By microscopical examination, a thin rasorial section of the cortical portion showed the tubes of Ferrein and the corpora Malpighiana to contain granular matter and the so-called Gluge's inflammatory corpuscles, at the expense of the normal epithelium. Many of the epithelial cells were badly shaped or shrivelled. The tubes of the medullary portion seemed but little affected.

The white points spoken of were composed of a delicate fibrillated tissue, the fibrillæ being made up of the same granular matter arranged in a linear series; a view borne out by the fact that the tubes immediately surrounding these points had much more granular matter than the others. No fat in a free state was found.

In this case, there was nephritis of probably long duration, but having a slow progress. The fibro-cellular tissue does not appear to have been much affected, and therefore we did not find corresponding changes in the size and shape of the organ.

The white masses, situated as they were in the midst of a congested tissue, and so well circumscribed, might well have passed for crude gray tubercles,

had they not been microscopically examined. I may add, there is every probability that here the cardiac disease existed first.

**CASE IV.—*Œdema of Lower Extremities, with Renal Symptoms, nineteen months—Cardiac Symptoms, with Œdema of Upper Extremities and Face, eight months—Albuminuria—Death. Autopsy: Disease of Kidneys and Heart.***—M. J., æt. 17, entered the Massachusetts General Hospital February 26, and gave the following report of the history of her disease: Fifteen months since, while at usual work, noticed in morning a slight swelling of feet. For several months, this did not increase; but after that, could not wear her usual shoes. Eight months since, began to have some cardiac palpitation, with a dry cough and dyspnoea. Soon after this, œdema of upper extremities commenced, attended with much general languor and depression. At time of entrance was quite feeble; countenance had a pale, flabby aspect, but no œdema of it or upper extremities. No local renal symptoms, and no pain upon pressure over region of kidneys. Œdema of legs up to knees. No præcordial prominence, but an unusual large space of flatness on percussion. First sound attended with a well-marked bellows murmur, which is very rough under right clavicle, and is transmitted to back and up carotids. Second sound masked by a coarse murmur over aortic valves. Both sounds not diffused. The pulmonary signs were those of oppression at base of chest, where there was flatness on percussion, and some crepitus, as though from pulmonary œdema. Urine examined, had a specific gravity 1.020, acid, and copious precipitates of albumen by both heat and acids. By microscope, the usual albuminous casts of the uriniferous tubes.

From this time no new symptoms appeared—the progress of the disease consisting in an increase of those then existing. Such were the palpitation, cough, dyspnoea, and general œdema, the last of which was so excessive that the skin of the legs burst, and the eyes were closed.—Patient died on May 5th.

*Autopsy twenty-four hours post-mortem.*

**Œdema.**—Legs bursting with serum—

Left pleura contained	. . . . .	one pint of serum.
Right pleura	" . . . . .	two pints of "
Pericardium	" . . . . .	½ ss "
Peritoneum	" . . . . .	three pints of "

**Lungs.**—Much compressed by effusion, but tissue normal. Old pleural adhesions at both sides, but no recent lymph.

**Heart.**—Weight 8 oz., red and firm; both ventricles somewhat hypertrophied. Cavity of left somewhat enlarged. Mitral valve so contracted as scarcely to admit the tip of the little finger. The aortic valves similarly contracted, with a trace of vegetation on each. No ossification.

**Alimentary canal** presented nothing remarkable.

**Liver and spleen** normal; the former not fatty.

**Kidneys.**—Weight of each 3 oz.; rather small, and apparently quite diseased. Surface nearly regular. External tunic stripped off smoothly, and leaving no trace of redness except two or three defined spots. Incised, whole aspect rather pale. Cortical substance opaque, yellowish-white, or fawn-coloured; not properly mottled, but looking as though infiltrated with albuminous, granular matter. Medullary portion not of remarkable aspect; not flaring, or abnormally approaching the periphery. On comparing the whole appearances with some of those of Rayer's Plates, the case corresponded quite closely with that of Fig. 4, Pl. vi.

By microscopical examination, a rasorial section of the cortical portion

showed the tubes of Ferrein and the Malpighian bodies much misshapen, often contracted and dilated, and many of them crowded with a fine granular matter existing in the place of the usual epithelium, the cells of which, when present, were similarly loaded with granules. The tubules of the medullary portion had a like appearance, though less marked. The fibro-cellular tissue was both hypertrophied and condensed—and was infiltrated with the same granular matter, though of a more albuminous nature. No appearance of free fat by the microscope; and the granular matter, treated with ether under the microscope, only very slightly disappeared.

A portion of the organ was sent to an excellent chemist for analysis; and he returned the following result: "The whole is mostly albuminous and fibrinous, with scarcely a trace of free fat."

I have thought this a fair example of chronic nephritis, going on to its last and worst form; and the kidneys presented, both grossly and microscopically, a good specimen of the appearances found in the third stage of Bright's disease, according to my own experience.

The presence of such quantities of inflammatory products, and the almost entire absence of fat, are well worthy of note. Unlike the last, it is probable that here the disease of the kidney existed first.

*CASE V.—Œdema and Ascites of nine years coming on after Child-birth—Diarrhœa of three months—Albuminuria—Death. Autopsy: Disease of Kidneys and Fatty Liver.*—R. S., æt. 42, entered the Massachusetts General Hospital, Sept. 4th, and gave the following history of her case. Nine years since, after birth of child, noticed, without other symptoms, an œdema of the feet. This gradually extended to abdomen, and even into chest, so that the pulmonary function was impeded.

Has noticed no renal or urinary symptoms, except variation in quantity of urine, which has always been in an inverse ratio to the amount of dropsy. Three months since, a simple diarrhœa coming on, the ascites almost entirely disappeared. Three weeks since, this diarrhœa became aggravated, reducing her to her present feeble condition.

At time of entrance, there was an oppressive ascites, and much œdema of the lower extremities.

The urine was albuminous to the ordinary tests. The diarrhœa did not seem at all amenable to treatment, and four days after entrance she died, apparently from debility.

*Autopsy eight hours post-mortem.*

*External aspect.*—Adipose tissue everywhere abundant, and one inch thick in parietes of abdomen.

*Brain* normal.

*Lungs* healthy, but little pleural effusion.

*Heart* normal, but mediastinum loaded with fat.

*Alimentary canal* had a tolerably healthy aspect, except the lower end of colon, where the mucous membrane was reddened and injected.

*Liver.*—Weight 5 lbs.; large, and having rounded edges, of a light fawn colour, and a doughy, flabby feel. Incised, its aspect was quite pale and lifeless. It greased the knife, and a section put under the microscope showed the acini crowded with fat globules, which rendered pale and almost replaced entirely their tissue.

The few hepatic cells seen were loaded in the same way.

*Kidneys.*—Weight of each 3 oz.; small, but of usual shape. Rather pale,

but surface not rough. Incised, presented a pale, anæmic, tough aspect. The cortical portion had a decided granulated aspect, not really mottled. Tissue was rather firm. The tunic stripped off, carried with it minute portions of the organ, leaving the external surface with the same pale anæmic aspect as the internal.

In fact, the whole appearance of the organ was quite like that of the last case, and in comparing it with Rayer's plates, I fixed upon the same figure, as best illustrating its aspect.

By microscopical examination, a rasorial section of the cortical portion showed the tubes of Ferrein and the Malpighian bodies to be much misshapen, and their interior more or less occupied with granular matter, which was even more abundant than in the last case. But little healthy epithelium was seen. The fibro-cellular tissue was considerably changed, and infiltrated with granular and aluminous matter. No free fat visible, except here and there a small globule. Tried with the common tests of heat and ether, the organ yielded no perceptible amount of fat.

Both the gross and microscopical appearances met with in this case correspond, as will be seen, quite closely with those of the last, alongside of which I have introduced it, from the difference as to the general adipose condition of the two patients. In the former one, it will be remembered, the fatty tissue was quite absent; the liver contained but little free fat. In the latter, the opposite condition everywhere exists, the liver loaded with it. But in both the same condition of the kidney is found; a fact which certainly bears upon the fatty nature of Bright's disease, which Dr. Johnson has characterized as "precisely analogous to the fatty degeneration of the liver."

Were it not for hurdening the article with details, other cases of similar character and importance might be introduced; but they would not, perhaps, illustrate any better than the preceding, the idea I have intended to convey as to the nature of this disease. In carefully recording cases of this disease, as they occur here and there, one is much surprised at the want of variety as to both gross and pathological appearances met with. In one well-marked, yet ordinary case, will be found nearly all that may subsequently be seen in the fifty that follow.

The following and concluding case I do not introduce as particularly illustrative of disease. It is one, however, possessing more than ordinary interest, for, in my opinion, the kidneys were found in just that condition we should expect to find them in chronic Bright's disease, according to the *new view* of the subject; whereas there do not appear to have been at all any symptoms of that affection. As a whole, it simply illustrates what I have remarked on a preceding page, viz: that there may be here, as well as in any other organ, a simple adipose accumulation with comparative impunity, so long as the fat does not occur in, or injure, the real functional tissue of the organ.

*CASE VI.—Canceroid Disease of Antrum—No Renal or other Symptoms—Partial removal of Disease—Supervening Pneumonia—Death in two weeks. Autopsy: Disease of Lungs and Fatty Kidneys.*—R. M., æt. 62, entered the Massachusetts General Hospital June 26th, and gave the following report:—

Has always enjoyed fine and robust health until five months since, when,

following continued dull pain in right antrum, there appeared in that region, a tumour. Aside from loss of sleep caused by pain, general health has not been disturbed. Has had no hepatic or renal symptoms; and, at time of entrance, appeared quite well, with the exception of local trouble.

Three days after entrance the tumour was partially removed, and proved to be one of those canceroid affections starting from the epithelial tissue. One week after, a general febrile disturbance ensued, and there appeared both the rational and physical signs of inflammation of the left lung; under which, two weeks from entrance, the patient sank and died.

I regret that no opportunities presented for examining the urine for albumen during life. It was reported as not unnatural, and there were no symptoms to call one's attention to its chemical examination.

*Autopsy* fourteen hours *post-mortem*.

*Head* not examined.

*Lungs*.—The lower lobe of right lung presented all the appearances of pneumonia of the second stage. Right lung natural.

*Heart* normal. *Alimentary canal* healthy. *Spleen* healthy. *Liver* of natural size and appearance. Examined microscopically and otherwise, it appeared *unusually free from fat*.

*Kidneys*.—Weight of each  $4\frac{1}{2}$  oz., of natural shape and colour. Incised, tissue not at all congested, and of a light fawn colour, having the usual firmness; but there appeared to be a disproportion between the cortical and medullary portions of the organ—the former dipping down to near the pelvis, while the latter appeared buried in it. Stripping off the tunica, the surface was smooth, not pale or granulated. On the anterior surface, and at the lower extremity of the left kidney, was a cyst one-third of an inch in diameter, and apparently set in the tissue of the organ, being filled with a dirty, brown-coloured fluid. Both pelves contained quite an amount of free fat.

Specific gravity of kidney 1.042 (1.046 is, I think, its healthy specific gravity).

By microscopical examination, the contents of the cyst were found to be numerous epithelial cells and scales, of nearly all sizes and shapes, nucleated, but containing free oil, which also existed in considerable quantity out of them, all floating in a dull-brown liquid.

The external surface of the cyst rested in immediate contact with the renal tissue. Rasorial sections of the cortical and medullary substance showed the tubes somewhat enlarged and rather irregular, and many of their epithelial cells were distended with oil globules, which also were quite numerous in the free state. In some places, the amount of fat seemed to almost block up the passage of the tube, as shown by transverse sections. Fat globules, but no fat cells, were also seen in the matrix or fibro-cellular tissue. The Malpighian bodies appeared unchanged, and contained no fat, either free or combined.

A chemical analysis of the organ showed a very large per centage of fat.

The bladder had a normal aspect; but free fat existed on the surface of its mucous membrane, and its epithelial cells had much in their interior.

I will conclude by saying that, with this and the preceding cases, we have had an illustration of *fatty liver* with Bright's disease, and yet the kidneys almost free from fat; and also *fatty kidney without* Bright's disease, and the liver almost free from fat.

Boston, July, 1851.